

conduction aphasia has been suggested by recent studies investigating a sensory-motor integration network for speech and related functions. Sensory-motor integration has been studied extensively in the visual-motor domain, and a set of brain regions have been identified in the posterior parietal lobe of both monkeys and humans that appear to perform a transform function mapping between visual and motor representations. These areas show both sensory and motor response properties, are densely connected with frontal-motor areas, and are organized around particular motor effector systems (e.g., eyes vs. hands). Recent work in humans has identified a similar sensory-motor integration network for speech functions (or more accurately, for the vocal tract motor system). Functional imaging has found that a left dominant region within the Sylvian fissure at the parietal-temporal boundary (area Spt) exhibits the same response properties found in sensory-motor integration areas in the posterior parietal lobe. It has been proposed that area Spt is a central hub in a sensory-motor integration network that transforms auditory-based representations into vocal motor-based representations.

Interestingly, the location of area Spt at the parietal-temporal boundary is in the center of the lesion distribution associated with conduction aphasia. Furthermore, Spt activates during the performance of behaviors that are impaired in conduction aphasia (repetition, naming, short-term memory). For these reasons, and because Spt's functional properties show parallels to other known sensory-motor integration areas in the posterior parietal lobe, it has been suggested that conduction aphasia is a deficit caused by damage to area Spt and surrounding tissue, which disrupts the interaction between sensory and motor systems involved in speech.

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*See also* Aphasia; Production of Language; Working Memory in Language Processing

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## CONFABULATION

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One of the Latin roots of the term *confabulation* is *fabulari*, which became our word *fable*. When the German neurologists Karl Bonhoeffer, Arnold Pick, and Carl Wernicke began using the term in the early 1900s, they applied it to false memory reports, little fables, created by their patients, who suffered from a syndrome that later came to be known as Korsakoff's amnesia. When asked what they did yesterday, these patients do not remember, but will report events that either did not happen or happened long ago. The technical definition of confabulation the early neurologists coined has three components: (a) Confabulations are false, (b) confabulations are reports, and (c) confabulations are about memories.

During the remainder of the 20th century, however, the use of the term was gradually expanded to cover claims made by other types of patients, many of whom had no obvious memory problems, including patients who deny illness, split-brain patients (who have had their hemisphere surgically separated to prevent the spread of epileptic seizures), patients with misidentification disorders (who make false claims about the identities of people), and patients with schizophrenia, as well as children and normal adults in certain situations. Patients who deny that they are paralyzed have been claimed to confabulate when they provide reasons for why they cannot move ("My arthritis is bothering me," "I'm tired

of following your commands"). Another type of patient will deny blindness and attempt to answer questions about what he or she sees, producing what have been called confabulations ("It's too dark in here"). Misidentification patients have been said to confabulate when asked what the motives of the "impostor" are, or why someone would go through all the trouble to impersonate someone else ("Perhaps my father paid him to take care of me"). Similarly, when the left hemispheres of split-brain patients attempt to answer questions without the necessary information (which is contained in their right hemispheres), this has also been called a confabulation.

There are thus currently two schools of thought on the proper scope of the concept of confabulation: (a) those who remain true to the original sense and so believe that the term should only be applied to false memory reports and (b) those who believe that the term can be usefully applied to a broader range of disorders. This possible expansion of the concept forces several difficult questions. Has the concept expanded so much as to become meaningless? Do the new confabulation syndromes share anything significant with the classical memory cases? Minimally, some confabulation syndromes involve memory (Korsakoff's, aneurysm of the anterior communicating artery), whereas others involve perception (denial of paralysis or blindness, split-brain syndrome, misidentification disorders). This entry focuses on the broader concept of confabulation and includes a description of confabulations based on both memory and perception. It will also examine what is known about the neuropsychology of confabulation.

### The Broader Sense of Confabulation

The following definition is based on the idea that confabulation syndromes involve malfunctions in different knowledge domains, as well as executive system damage.

Jan confabulates that  $p$  (where  $p$  is some proposition) if, and only if

1. Jan claims that  $p$ .
2. Jan believes that  $p$ .
3. Jan's thought that  $p$  is ill grounded.

4. Jan does not know that her thought is ill grounded.
5. Jan should know that her thought is ill grounded.
6. Jan is confident that  $p$ .

"Claiming" covers a wide variety of responses by subjects, including drawing and pointing. The second criterion expresses the sincerity of confabulators. The third criterion refers to the problem that caused the flawed response to be generated; this problem is the first factor. The fourth criterion refers to the failure of the second phase, the failure to reject the flawed response (the second factor). The fifth criterion captures the normative element of our concept of confabulation. If the confabulator's brain were functioning properly, he or she would not make that claim. The last criterion refers to another phenomenon typically seen in confabulators, the serene certainty they have in their communications, which may be connected to the frequent finding of low or abolished sympathetic autonomic activity in confabulating patients.

## Types of Confabulation

### *Confabulations About Memories*

The presence of confabulation is a defining characteristic of two memory syndromes, Korsakoff's syndrome and a similar syndrome caused by aneurysm of the anterior communicating artery, an artery that forms the anterior portion of the circle of Willis. Alzheimer's patients will also frequently confabulate about memories, and young children are also prone to reporting false memories. These four types of confabulators (Korsakoff's patients, anterior communicating artery patients, Alzheimer's patients, and young children) have an initial memory retrieval problem, coupled with a failure to check and correct their false memories. Apparently the children's prefrontal areas have not yet fully developed, while the Alzheimer's patients' prefrontal lobes have been damaged by the amyloid plaque lesions. In contrast, there exist many memory patients with damage restricted to more posterior parts of the memory system (e.g., to the hippocampus or other parts of the temporal lobes) who openly admit that they

cannot remember and are not prone to producing confabulations.

### *Confabulations About Perceptions*

#### Vision

Anton's syndrome is a condition in which the patient is partially or entirely blind yet insists that her vision is fine. The posterior damage site typically involves bilateral lesions to the occipital cortex, causing the blindness, coupled with prefrontal damage, apparently causing an inability to become aware of the blindness. Some of these patients appear to be mistaking hallucinations for actual perceptions. Split-brain patients may also confabulate when the left hemisphere is asked about perceptual information contained only in the right hemisphere.

#### Somatosensation

The patients who deny that they are paralyzed have a condition referred to as *anosognosia*, meaning unawareness of illness. They typically have damage to one or more lower level somatosensory systems responsible for representing the affected limb, in addition to frontal damage that may compromise areas capable of making the patient aware of the damage to the lower level somatosensory systems.

#### Person Perception

Perceptual confabulations are also issued by patients suffering from the misidentification syndromes (especially Capgras syndrome, in which the patient claims that people he or she knows well have been replaced by similar looking impostors). Such patients do not perceive people close to them correctly and produce confabulations about impostors as an attempt to explain this. These syndromes also show a pattern of posterior cortical damage, often to the temporoparietal cortex, coupled with prefrontal damage, typically in the right hemisphere.

#### Confabulations About Intentions and Actions

Patients who have undergone a split-brain operation may confabulate about actions performed by the right hemisphere. In a typical experiment, commands are sent to the right hemisphere only, while the left hemisphere, unaware of this, confabulates a reason for why the left hand (controlled by the right

hemisphere) obeyed the command. Similar sorts of confabulations can be elicited by brain stimulation. For example, the patient's cortex is stimulated, causing an arm to move. When asked why the arm moved, the patient claims he or she felt like stretching the arm. Hypnotized people may also confabulate about actions. In a typical case, the subject is given a hypnotic suggestion to perform a certain action but then confabulates by offering a different, ad hoc, reason for the action when asked.

#### Confabulations About Emotions

False or ill-grounded self-attributions of emotions are another type of confabulation. For example, in one experiment, people were given an injection of adrenaline without their knowledge but attributed their inability to sleep to things such as uneasiness about a romantic relationship or nervousness about what they had to do the next day.

### The Neuropsychology of Confabulation

There are several clues as to the nature and location of the neurological damage in confabulation patients: (a) The patients with aneurysms of the anterior communicating artery—a tiny artery near the anterior commissure that completes the anterior portion of the Circle of Willis—provide our best clue about the locus of the frontal problems in memory confabulation. This artery supplies blood to portions of the posterior orbitomedial cortex known to have mnemonic functions. (b) Split-brain patients confabulate about information perceived by the right hemisphere. The right hemisphere, or lack of communication with the right hemisphere, shows up in several of the perceptual confabulations. This may indicate that confabulations are created by the left hemisphere in the absence of disconfirming information possessed by the right hemisphere.

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*See also* Amnesia; Anosognosia; Capgras Delusion; Delusions; Fregoli Delusion

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## CONSCIOUS THINKING

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This entry addresses the question of the nature of thought and its relation to consciousness. Current philosophical orthodoxy holds that thought and consciousness are only *contingently* related. Though thoughts *may be* conscious, it is not in their *nature* to be such. The problem of thought and the problem of consciousness—for most philosophers, how they fit into a naturalistic worldview—are thus wholly distinct. Hence, the present intractability of the latter problem does not constitute an in-principle barrier to a scientific solution to the former. Reasons are reviewed here for thinking that, on the contrary, thought and consciousness are inextricably linked and, thus, that the prospects for naturalistic explanation of thought are not as good as some have thought.

### Intentionality and Rationality

Late 20th-century theories of thought and thinking in the analytic philosophical tradition focused

on the problem of how it is that presumably purely physical beings such as ourselves can be in states (or have brains that are in states) that are *about* things or have “intentionality” and that can bear logical relations to each other such that sequences of them may be *rational* or *irrational*.

To say that a mental state is *intentional* is to say that it has a *content*—something analogous to the *meaning* of a sentence. The term *intentional* is used here in application only to so-called propositional attitudes (beliefs, desires, hopes, etc.) and the constituent thoughts that render them intentional (what they are about), skirting the issue of the intentionality of perceptual and other sensory experiences. The sentence “Blood is red,” for example, has (in English) a particular meaning and in virtue of this meaning (derived from the meanings of its constituent terms) is *about* blood and *says that* it is red. The sentence “Mud is brown,” in contrast, has a different meaning and is about something else and says something different about it. Further, these sentences have, in virtue of their meanings, *truth conditions*—that is, they specify the worldly conditions under which they are true (or false)—as well as *logical properties*—relations of consistency, inconsistency, and entailment to other sentences. The sentence “Blood is red” is true if and only if blood is red; otherwise, it is false; “Blood is red” and “Mud is brown” are logically consistent with each other (they can both be true); “Blood is red” and “Blood is brown” are not consistent with each other (they can’t both be true); and “Blood is red and mud is brown” logically entails “Mud is brown.” Exactly analogous things may be said about the *thoughts* that blood is red and that mud is brown. Indeed, it is a traditional assumption in analytic philosophy of language that the meanings of sentences derive from (or *are*) the contents of the thoughts they are (by convention) used to express. Thus, thoughts have contents, which determine their truth conditions and logical relations to each other. (Jerry Fodor has championed the view that we think in a “language of thought,” a system of symbolic representations with sentence-like structures.)

### Naturalism

Philosophical theories of intentionality and rationality have typically been committed to “naturalism” (the view that these phenomena can be explained in terms consistent with the natural sciences—in